

SUBSTITUTE SPECIFICATION PAGE  
"R53"  
OF U.S. PATENT APPLICATION 09/560,109,  
ATTORNEY DOCKET NO. M-5628 US

attached  
2-10-04

input channel (see Equation 2 for the response of a transfer channel).

[0100] The output signal  $a'_k$  from pre-equalizer (or feedforward) section 1901 is input to adder 1902. Adder 1902 subtracts the signal  $a''_k$  from selector 1906 from the output signal  $a'_k$  from feedforward section 1901. The resulting signal  $a'''_k = a'_k - a''_k$  is input to slicer 1903. Slicer 1903 outputs a symbol  $\hat{a}_k$  that is closest to the input signal  $a'''_k$ . The feedback section 1905 (see also feedback section 811 of Figure 8) of decision feedback equalizer 1900 comprises delays 1904-1 through 1904-L. Selector 1906 receives each of L past symbols  $\hat{a}_{k-1}$  through  $\hat{a}_{k-L}$  and uses these symbols to access a lookup table. The lookup table holds values  $\xi_1$  through  $\xi_Q$ . The output signal  $a''_k$  of selector 1906 then is that one of  $\xi_1$  through  $\xi_Q$  that corresponds to the combination of inputs  $\hat{a}_{k-1}$  through  $\hat{a}_{k-L}$ . The time required to look the results up in a look-up table is much less than the time required to perform the L multiplications and L additions required of the feedback section shown, for example, as feedback section 811 of Figure 8.

[0101] In some embodiments, selector 1906 receives the look-up values  $\xi_1$  through  $\xi_Q$  as input signals. In some embodiments, the look-up values  $\xi_1$  through  $\xi_Q$  are preset. The look-up values  $\xi_1$  through  $\xi_Q$  can also be adaptively chosen to optimize performance of the receiver of which decision feedback equalizer 1900 is a part. In most embodiments,  $Q = A^L$  where A is the size of the symbol alphabet.

[0102] As an example, in a system using the PAM-5 alphabet where  $L=2$ , and  $Q$  is 25 there are twenty-five (25) lookup values (i.e.,  $Q=25$ ). Because the intersymbol interference in the input signal to adder 1902 is the result of two (2) ISI symbols,